

REMARKS

Applicants respectfully request reconsideration of this application as amended. Claims 1-62 are pending in the application. Claims 5, 9, 11, 21, 24, 29, 34, 38, 50, 51, and 53 have been amended. No claims have been canceled.

Claims 1, 12, 17, 18, 30, 46, and 47 stand rejected under 35 U.S.C. § 102(b) as being anticipated by German Patent No. DE 19800953 C1 of Ritter (“Ritter”). The Examiner cites the abstract in Ritter as disclosing the elements of each of these claims. The abstract in Ritter discloses an OFDMA multi-carrier method used for the transmission of data symbols. As set forth in the abstract, in Ritter’s OFDMA method, subcarriers and a segment of a frequency spectrum are assigned to a mobile station for use in communication between a base station and the mobile station. The quality of different segments is measured by the mobile station. The mobile station identifies at least one preferred segment, suitable for its connection with the base station, and sends that information to the base station.

Applicants respectfully submit that Claim 1 is not anticipated by Ritter under 35 U.S.C. §102(b). Amended Claim 1 includes the following limitations:

1. A method for subcarrier selection for a system employing orthogonal frequency division multiple access (OFDMA) comprising:
a subscriber measuring channel and interference information for a plurality of subcarriers based on pilot symbols received from a base station;
the subscriber selecting a set of candidate subcarriers;
the subscriber providing feedback information on the set of candidate subcarriers to the base station; and

the subscriber receiving an indication of subcarriers of the set of subcarriers selected by the base station for use by the subscriber. (emphasis added)

As set forth above, Claim 1 includes a limitation that the subscriber measures both channel information and interference information for multiple subcarriers based on pilot symbols received from a base station. This features is clearly not set forth in the abstract of Ritter. Ritter does disclose that the quality of different segments of a frequency spectrum is measured by the mobile station; however, there is no teaching that such measurements include both channel information and interference information for multiple subcarriers based on pilot symbols received from a base station. In view of this, Applicants respectfully submit that the present invention as claimed is not anticipated by Ritter.

Claims 12, 17, 18, 30, 46, and 47 include a substantially similar limitation to that described above with respect to Claim 1. Therefore, for the same reason as set forth above, the present invention as claimed in Claims 12, 17, 18, 30, 46, and 47 is not anticipated by Ritter.

The Examiner rejected Claims 2-4, 8, 13, 31-33 and 37 under 35 U.S.C. §103(a) as being unpatentable over Ritter as applied to claim 1 above, and further in view of U.S. Patent No. 6,330,460 of Wong ("Wong"). Wong discloses a base station of a wireless communication system that includes an adaptive antenna array and beam forming mechanism for forming simultaneous multiple forward links. The Examiner states that Ritter discloses all elements of the claims with the exception of teaching a subscriber measuring signal-plus-interference-to-noise ratio (SINR) of each of the clusters of subcarriers. However, the Examiner believes that Wong teaches measuring the SINR. Therefore, the Examiner believes that the present invention as claimed in Claims 2-4, 8, 13, 31-33 and 37 is obvious in view of the combination of Ritter and Wong. Applicants respectfully disagree.

Ritter does not teach measuring interference, nor measuring the SINR of each of the clusters of subcarriers. Wong's disclosure focuses on the beamforming associated with an antenna array for use in a wireless communication system. The wireless communication system described in Wong is a CDMA communication system. There is no mention of an OFDMA system. Applicant respectfully submits that because of the differences between CDMA and OFDMA, one skilled in the art would not look to combine the CDMA-based teachings of Wong with the OFDMA teachings of Ritter to arrive at the present invention as claimed. In CDMA, the spectrum is used in all cells. In contrast, in OFDMA, sets of subcarriers are not necessarily used in all cells. Within one cell, the subscribers are coordinated to have different subcarriers in OFDMA. Because of a desire for aggressive frequency reuse (e.g., the same spectrum used for multiple neighboring cells), intercell interference can arise. Thus, a problem associated with OFDMA is overcome by measuring both channel information and interference information and using that information to select OFDMA subcarriers. One skilled in the art would not look to solve this problem using the disclose techniques in Wong. In fact, Wong is not remotely directed to this problem. In view of this, Applicant respectfully submits that the present invention as claimed in Claims 2-4, 8, 13, 31-33 and 37 is not obvious in view of the combination of Ritter and Wong.

Furthermore, with respect to Claims 3, 4, 32, 33, the present invention as claimed sets forth a subscriber measuring inter-cell interference, and then selecting candidate subcarriers based on the inter-cell interference. This is of significance because such information may be used for interference avoidance and load balancing. Ritter does not teach, mention nor disclose measuring inter-cell interference in OFDMA. Wong does not overcome the deficiency of Ritter. That is, as discussed above, Wong is directed to beamforming and CDMA, not measuring inter-cell interference for use in selecting candidate subcarriers in OFDMA. The Examiner states that

col. 8, lines 11-26 as teaching inter-cell interference. However, this section teaches no more than determining the SINR at the mobile station given ambient interfering sources among factors.

Wong does not teach, mention, nor disclose that inter-cell interference is measured along with an SINR value as in the present invention as claimed. The ambient interfering sources only effect the SINR value that is determined in Wong. In view of this, Applicants respectfully submit that the present invention as claimed in Claims 3, 4, 32 and 33 are not obvious in view of Ritter and Wong.

Moreover, with respect to Claims 4 and 33, neither Ritter nor Wong teaches, mentions nor discloses interference avoidance in the context of OFDMA. That is, in the present invention as claimed, the selection of subcarriers in an OFDMA system is performed to avoid inter-cell interference. Such a feature is not set forth in either Ritter or Wong. In view of this, Applicants respectfully submit that the present invention as claimed in Claims 4 and 33 are not obvious in view of Ritter and Wong.

Furthermore, with respect to Claim 13, the present invention as claimed sets forth that at least one pilot symbol from another cell is transmitted at the same time as pilot symbols received from a base station and a collision occurs. By allowing overlapping pilot symbols, the subscriber is able to determine the channel conditions with or without the interference. This finds application in inter-cell OFDMA coordination in determining whether to allow the same set of subcarriers in multiple cells. This is clearly not disclosed in Ritter or Wong. In fact, this is different than CDMA where the spectrum is used in all cells. In view of this, Applicants respectfully submit that the present invention as claimed in Claim 13 is not obvious in view of Ritter and Wong.

The Examiner rejected Claims 15, 16, 44 and 45 under 35 U.S.C. §103(a) as being unpatentable over Ritter in view of Frodigh, and further in view of U.S. Patent No. 6,327,472 of

Westroos et al (“Westroos”). Claims 15, 16, 44 and 45 set forth selecting subcarriers based on traffic load information on each cluster of subcarriers. Thus, the OFDMA subcarrier allocation of the present invention as claimed is based on channel conditions (e.g., SINR) and traffic load on each cluster.

Frodigh discloses an adaptive channel allocation in a frequency division multiplexed system. Neither Ritter nor Frodigh disclose selecting subcarriers based on traffic load information. However, the Examiner believes that Westroos discloses a load monitoring device that collects and holds traffic information on neighboring cells. The load monitoring device monitors the traffic load for a number of cells and this traffic load can be used to make channel assignments by taking into account the load situation. Thus, Westroos discloses load balancing at the cell level, not at the OFDMA cluster level. Load balancing at the OFDMA cluster level is much more efficient. In view of this, Applicants respectfully submit that the present invention as claimed in Claims 15, 16, 44 and 45 are not obvious in view of Ritter, Frodigh, and Westroos.

The Examiner rejected Claims 19, 20, 23, 48, 49, and 52 under 35 U.S.C. §103(a) as being unpatentable over Ritter in view of U.S. Patent No. 5,507,034 of Bodin (“Bodin”). Bodin discloses a cellular communication system that provides for the selection of a channel for use in a pending communication. As set forth above, Claim 1 includes a limitation that the subscriber measures both channel information and interference information for multiple subcarriers based on pilot symbols received from a base station. This feature is clearly not set forth in the abstract of Ritter. That is, there is no teaching in Ritter that such measurements include both channel information and interference information for multiple subcarriers based on pilot symbols received from a base station. Bodin does not solve this lack of teaching by Ritter. In other words, Bodin does not disclose a subscriber measuring both channel information and interference information for multiple OFDMA subcarriers based on pilot symbols received from

a base station. In fact, Bodin does not disclose an OFDMA system and is not directed to the same problem(s) as the present invention as claimed as mentioned above. Therefore, Applicants respectfully submit that one skilled in the art would not look to Bodin and its teachings and combine those teachings with Ritter to arrive at the present invention as claimed. In view of this, Applicants respectfully submit that the present invention as claimed in Claims 19, 20, 23, 48, 49, and 52 are not obvious in view of Ritter and Bodin.

The Examiner rejected Claims 29 and 62 under 35 U.S.C. §103(a) as being unpatentable over Ritter in view of U.S. Patent No. 6,242,565 of Feuerstein ("Feuerstein"). Applicant assumes that the Examiner meant U.S. Patent No. 6,141,565, as U.S. Patent No. 6,242,565 is related to a different art. Claim 29 as amended sets forth a base station in a cell coordinates with other cells to make a cluster assignment decision in response to receiving inter-cell interference information. The base station performs subcarrier allocation for OFDMA to allocate OFDMA subcarriers in clusters to subscribers based on inter-cell interference avoidance and intra-cell traffic load balancing in response to feedback information.

Feuerstein discloses a cellular or wireless communication network in which parameters are sent to various elements in order to optimize network operation. Feuerstein discloses measuring conditions at various cell sites throughout the network. For example, Feuerstein discloses a cluster of cell are utilized to measure local interference and/or local traffic load conditions in order to make estimates of optimum sector orientations and sector beam lists. Neither Feuerstein nor Ritter discloses a base station in a cell coordinating with other cells to make a cluster assignment decision in response to receiving inter-cell interference information. In view of this, Applicants respectfully submit that the present invention as claimed in Claim 29 is not obvious in view of Ritter and Feuerstein.

With respect to Claim 62, the present invention as claimed includes a base station in the cell, where the base station performs subcarrier allocation for OFDMA to allocate OFDMA subcarriers in clusters to multiple subscribers based on inter-cell interference avoidance and intra-cell traffic load balancing. Neither Ritter nor Feuerstein teach, mention nor disclose allocating OFDMA subcarriers based on inter-cell interference avoidance and intra-cell traffic load balancing. The Examiner admits this with respect to Ritter, but offers Feuerstein to make up for Ritter's deficiencies. However, the portions of Feuerstein set forth by the Examiner are completely silent with respect to allocating subcarriers in clusters to subscribers based on inter-cell interference avoidance and intra-cell traffic load balancing. In view of this, Applicants respectfully submit that the present invention as claimed in Claim 62 is not obvious in view of Ritter and Feuerstein.

The Examiner rejected Claims 7, 14, 26, 27, 28, 36, 43, 55, 58, 60, and 61 under 35 U.S.C. §103(a) as being unpatentable over Ritter in view of U.S. Patent No. 5,726,978 of Frodigh ("Frodigh"). For the same reasons given above with respect to Claim 1, the present invention as claimed is not obvious in view of Ritter and Frodigh. Ritter does not disclose a subscriber measuring both channel information and interference information for multiple subcarriers based on pilot symbols received from a base station. Frodigh does not overcome this deficiency. In view of this, Applicants respectfully submit that the present invention as claimed in Claims 7, 14, 26, 27, 28, 36, 43, 55, 58, 60, and 61 are not obvious in view of Ritter and Frodigh.

Furthermore, Claims 28 and 57 sets forth performing subcarrier allocation based on subscriber priority. Frodigh does not teach, mention nor disclose the use of subscriber priority in OFDMA subcarrier allocation. Therefore, the combination of Ritter and Frodigh do not disclose

all the limitations in Claims 28 and 57. In view of this, Applicants respectfully submit that the present invention as claimed in Claims 28 and 57 are not obvious in view of Ritter and Frodigh.

The Examiner did indicate that Claims 5-6, 9-11, 21-22, 24-25, 34-35, 38-42, 50-51 and 53-54 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form, including all of the limitations of the base claim and any intervening claims. Applicants have amended Claims 5, 9, 11, 21, 24, 34, 38, 50, 51, and 53 to include substantially all the limitations of their rejected base claim. Therefore, Applicants respectfully submit that Claims 5-6, 9-11, 21-22, 24-25, 34-35, 38-42, 50-51 and 53-54 are in condition for allowance.


Accordingly, Applicants respectfully submit that the rejections under 35 U.S.C. §102 and §103(a) have been overcome by the amendments and the remarks and withdrawal of these rejections is respectfully requested. Applicants submit that Claims 1-62 as amended are now in condition for allowance and such action is earnestly solicited.

Please charge any shortages and credit any overcharges to our Deposit Account No. 02-2666.

Respectfully submitted,

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